# Country paper: Animal identification and registration in Macedonia

***V. Kondratenko***

*Veterinary Directorate, Ministry of Agriculture Forestry and Water Economy, Macedonia*
*E-mail: vkondratenko@idvet.gov.mk*

## Introduction

With 25 333 km$^2$ of surface area and 2 000 000 inhabitants, Macedonia is one of the smallest European countries. Livestock accounts for 35% of agricultural GDP and products of animal origin contribute 8% of all agricultural exports and 23% of agricultural exports to the EU. Lamb accounts for >90% of this trade. Cattle and small ruminants play a vital role for both cash income and food security. Out of approx. 180 000 farming households 48 000 keep cattle and 15 000-20 000 sheep.

## Background

Following the outbreak of foot and mouth disease (FMD) in Macedonia in 1996, the EU imposed a ban on livestock imports from fYR Macedonia which was only lifted in 1999. The sheep population dropped from > 2 million in 1996 to under 1 million in 2001 since its profitability depends largely on the export of lamb to Greece and Italy.

A mission carried out by the EC Food and Veterinary Office in February 1999 concluded that the lack of a herd / flock registration system combined with the non-existence of an individual animal identification system continued to expose livestock to disease invasion and spread within the national territory (jeopardizing both prospects for livestock production and trade in live animals and animal products). The FVO recommended to complete herd and individual animal registration of bovines by end 1999 and of ovines and caprines by end 2000.

The outbreak of FMD in the EU and elsewhere in 2001 with its disastrous economic and animal welfare consequences resulted in a further tightening of legislation relating to animal I&R and movement control, notably in sheep and goats.

The EAR (European Agency for Reconstruction) managed "National Animal Identification Project" under the Phare 1999 COP commenced on 21 May 2002 and was designed to establish and make operational the

bovine database in line with Regulation (EC) No. 1760/2000 of the European Parliament and of the Council of 17 July 2000. The main objectives of the Project, led by GFA/ADT consortium, were to provide improved animal health surveillance and support disease, drug and residue monitoring programmes, to allow for better targeting of veterinary response to disease outbreak thereby limiting their negative economic, animal health and veterinary public health implications.

Since December 2004 the animal identification & registration system (I&R) for bovine animals is productive. More than 230 000 head of cattle are registered in the central database. About 100 users at local veterinary stations and at the Veterinary Directorate are using the system via the internet. The data capture in the field is carried out by using PDA which exchange the information with the central database. This guarantees a seamless flow of information without any medium break from the place of information capture to the central database. From the very beginning this infrastructure was designed to allow for any kind of data exchange between the field and the central database. At the moment, data exchange is limited to I&R data.

## Legal situation

Identification and registration of animals is regulated by the I&R Law (OJ 69/2004) which covers all species of domestic and also other animals. The Competent Authority for implementation of the I&R Law is the Veterinary Directorate.

The breeders and keepers of bovine, ovine and caprine animals are responsible for tagging and registration of animals. Ear tags are approved by the Veterinary Directorate and allow to identify each animal individually as well as the holding on which the animal was born and is being kept. The breeders and keepers of animals are responsible for keeping an up-to-date holding register in manual or computerised form containing all information concerning the origin, identification and, where required, destination of animals, which he has owned, kept, transported, marketed or slaughtered.

The Veterinary Directorate carries out the controls on proper implementation of the animal identification and registration system based on risk analysis. These inspection controls should cover at least 10% of the holdings on the territory of the Republic of Macedonia annually.

The I&R Law provides legal grounds and established the rules for the I&R system in Macedonia. The Law is based on the EU Regulation 1760/2000 for bovine animals and amendments have been made in order to meet the requirements of the EU Regulation 21/2004 for ovine and caprine animals.

## Software for I&R system

In order to meet the tight Project implementation schedule and taking into consideration the required man-months for developing such complex software it was decided to purchase an already developed product, implemented in at least one country. The purchased software was adopted and upgraded to meet local country requirements.

The software development started in January 2004. Testing in office and field environment takes 3 months and the first operational version was implemented in November 2004 when the cattle I&R system was launched. The software has since been developed and upgraded continuously. The software is based on the Oracle database and Oracle tools. The architecture includes the data server, application server, and the web server.

The central system is hosted by a private company (ASP = Application Service Provider), which is responsible for maintenance and availability of the whole system. The Central Processing Centre (CPC) is connected to the ASP by a wireless internet connection. The ASP provides the connection to the internet. All users can only use the internet to connect to the system.

The data entry in the field is based on PDA. Each veterinarian who collects data in the field is equipped with a PDA device. Each veterinary station is responsible for one region and the PDA contains all information concerning the holdings in their area of responsibility. The data between the PDA and the central database is exchanged daily via the PC of the veterinarian. The exchange between the PDA and the server is file based, that means that all information, which is exchanged between the PDA, the PC and the server are sent by files only. After the files of the PDA are stored on the central server, the automatic process loads the new information to the database. Users can only request changes from the last synchronization or (when needed) all data sets from the central database, that apply to him/her.

Data uploading and downloading is carried out through a web form, which invokes the processes for data checking and for updating the central databases (Figure 1).

The users of the system are the Veterinary Directorate, Veterinary Inspection and Veterinary clinics. The system is currently upgraded and will include paying agency, veterinary border inspection and the Veterinary faculty/institute. They will all access the system via the public internet and the web-based user interface.

The functionality of the system includes remote data entry (registration of new holdings, registration of newborn calves, imported animals, all types of movements, requests for eartags and replacement eartags) and data retrieval (searching for holdings, keepers, animals, lists of animals, tracing forward and backward, simple statistics, etc.). Data are password protected and can be accessed by named users; each of the users has a defined range of access. Each record entered is automatically given a

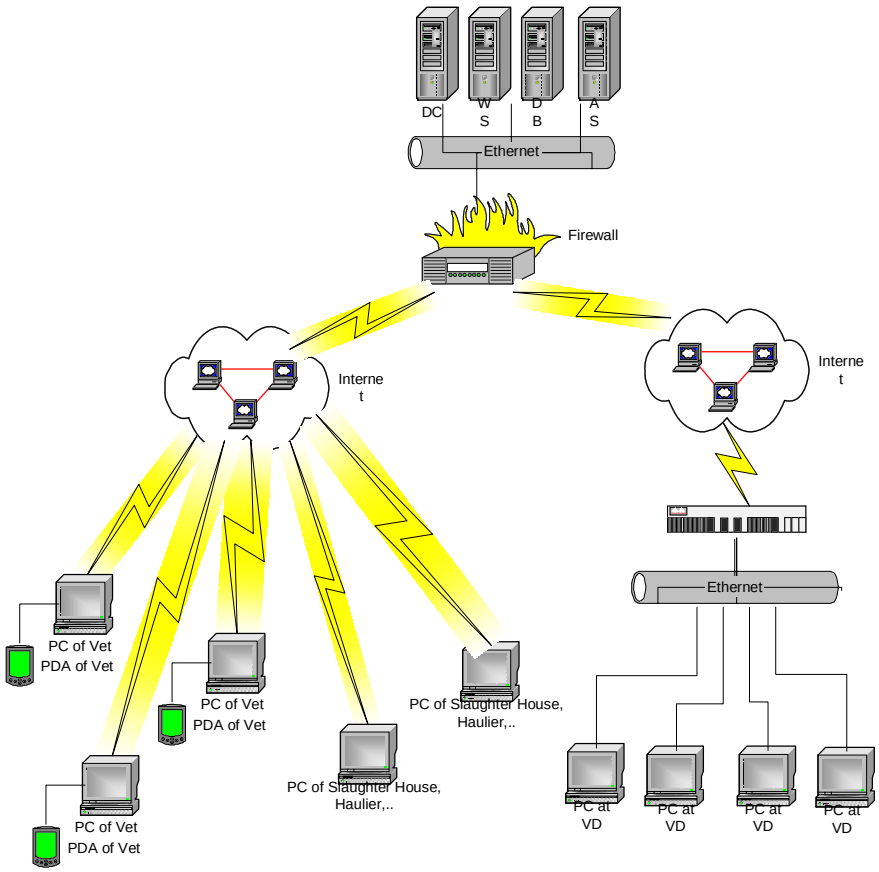


*Figure 1. Global structure of the system.*

timestamp and code of inserter. All updates to records are logged allowing insight into any given past date state, including tracing of any corrections made to data.

The database stores data on holdings, keepers, animal registrations and movements and deaths, issued eartags, replacement eartags, issued passports and replacement passports, animal premiums granted, service units and their individual employees (data inserters). Data quality is promoted by implementing a number of plausibility checks in the software (a priori - plausibility checks at data entry, and a posteriori - cross-checks at later times). Tight validation procedures are implemented at data entry, forcing the technicians to resolve errors before data entry. Since this year,data are being used for premium administrative control and all applications are cross checked with the central cattle register.

Upgrading and extension of the software

The system for identification and registration of animals (I&R) can be considered as the central system, which provides information at animal level to related applications like animal breeding, subsidy payment and veterinary applications dealing with treatment, vaccination and epidemiology of animal diseases. The basic information provided to those systems is the identification number of the animal and the localization of the animal. Since new requirements can arise in the future the I&R system is capable to allow for data exchange to new applications, which are not shown in f igure 2.

**Oracle Discoverer Forms**

Oracle Discoverer Forms (ODF) enables quick and effective reporting and enables better insight of the I&R system to decision makers. The ODF is producing user friendly reports- which can be easily created by choosing the right parameters needed for the report. Every field from database (this database is in fact data warehouse) can be easily renamed in order to be more compatible for the user in order to create the report rapidly. All the table joints are made in the background so the user does not need to write “selects”. Changing of one created report to another is easy e.g. if data in the report are connected with months of the year- data can be drilled down to a specific month or date or it can be drilled up. The graphic interface enables the user to create a graphic description of created reports - any type of graph can be created and also any formatting can be chosen. The ODF enables exporting of data, i.e. data received from the report can be exported to an excel sheet.

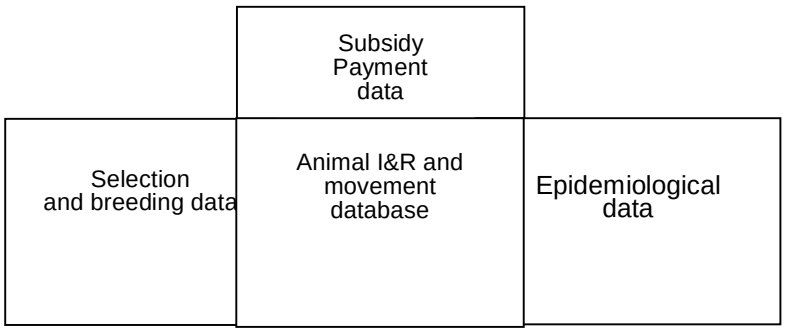


*Figure 2. I&R System and depending application.*

**Animal tracing**

This module enables tracing forward and backward of animals in predefined time period. The system can provide a list of all animals and holdings which were in contact with the infected animal. Combined with GIS module (in planning) , the system will enable rapid and effective response in case of disease occurrence.

**Subsidy module**

Linking the I&R system with subsidy payments for cattle producers: Subsidy payments can only be paid after cross-checking the submission form i.e. declared cattle number with those in the I&R system. This module is already operational, but due to organisational problems in the payment agency, the cross checks are carried out by the Veterinary Directorate – I&R Unit. This module will have an extension option for other species (e.g. sheep, goats, etc).

## Future extension and upgrading of the software

**Animal Health Component**

The technology used for cattle I&R enables fast and reliable collection, storage and transfer of data between VS (Veterinary Stations – service units) and VD (Veterinary Department). Introducing of barcode labels on blood tubes, planned as part of the bleeding component, has several advantages:

- Enables *monitoring of blood tubes from collecting to the final laboratory result* and back to the veterinary station and to the farm.
- Provides *reliable data on date of collection, date of submission to the laboratory*, date of diagnosis, date of destruction/slaughtering of animal, number of unsuitable blood samples, number of repeated tests required etc, which are an essential tool for disease control and eradication.
- *Reducing the labour and typing errors of VS* presently manually numbering the blood tubes, preparing the accompanying letters and reducing the labour and type errors of laboratories for manual preparation of receiving letters[1].

[1]Currently the VS write the ear tag number on the blood tubes during the bleeding campaign. Prior sending the shipment of blood samples to the laboratory, the VS are obligated to prepare an accompanying letter, consisting of numbers of ear tags of all bled animals. The laboratory is obliged to issue a reception letter consisting of numbers of all blood tubes received, of samples which are suitable and unsuitable for laboratory tests (haemolysed blood, broken tubes, etc). All a.m. activities are performed manually which is unreliable (significant part of typing errors) and time consuming (the total amount of blood samples for cattle, sheep and goats reaches 900 000 to 1 000 000). With the introduction of a bleeding software, manual data input will no more be necessary. Scanning of barcodes from the holding ID card, from the eartag and the labels on the blood tubes provides all necessary data for a.m activities which can be accessed via the VD website at any time.

- *Issuing of health certificates directly from the web application*, providing better control of health certification of animals and reducing fraud[2].
- *Updating of Central Holding Register*. According to the Veterinary Health Law and the Annual Order for control and eradication of diseases, cattle which produce milk for public consumption have to be annually tested for TBC and brucellosis, and the rest of the cattle population every two years, which results in a figure of about 50-60% of the cattle population tested each year. Introducing a bleeding component makes that I&R and AH come into a mutually beneficial partnership. I&R will provide data for keepers (name, surname, address, personal ID / tax ID etc), holdings (Holding ID, address with geographical coordinates, type of production, number of animals on the holding, animal species kept – when sheep / goat I&R will be fully operational) and animals (eartag number, species, date of birth, breed and sex). On the other hand the AH will provide the current number of animals on the farm – acquired during the bleeding campaign enabling comparison and updating of I&R Database. Furthermore the animal attributes will be extended, including date of testing, vaccination, bleeding and treatment, results of testing and restriction of movement. The farms will get their disease status, either free from disease or infected with subsequent control measures (restriction of movement in / out, slaughtering, stamping out etc.).

This module will also provide the information of all vaccinations and TBC testing on the level of individual animal. The module will be gradually extended to other species.

**GIS module**

According to the EU Reg. 21 / 2004, the holding register has to provide geographical coordinates (or equivalent indication of the geographical location of the holding) for each sheep holding. The Veterinary Directorate is planning to implement the GIS application to the current holding register (to include bovine holdings as well).

[2]According to the Veterinary Health Law. Health Certificates are required for movement of animals outside the municipality, sending the animal to the livestock market and for changing of ownership. Only tested and vaccinated animals can acquire the Health Certificate. Currently, any VS can issue a Health Certificate for any animal, which makes control of issuing very difficult. Introducing of a bleeding component will enable introducing of privileges, which means that VS will be able to issue a Health Certificate just for animals which are in their authorised area (e.g. VS “X” can no longer issue a Health Certificate for animal which is in area of VS “Y”). Such a clear definition of privileges already exists in I&R system - the VS can only register animals in their authorised area.

## Future integration of other species in the system

The "National Animal Identification Project" Phase II, started in November 2004 and one project component is to design a system for I&R of small ruminants (SR). The I&R system for SR is designed to comply with EU Reg. 21/2004. The plan for the next six months includes passing the relevant legislation, implementing the software, and preparing information materials for the keepers. The next step is to start with field activities i.e. first tagging campaign and registration of movements.

Other species, such as pigs, poultry, bees, pets etc are planned to be included after completion of I&R system for SR.